Title: LOW-COST, ACCESSIBLE VACCINE COOLER OPTIONS

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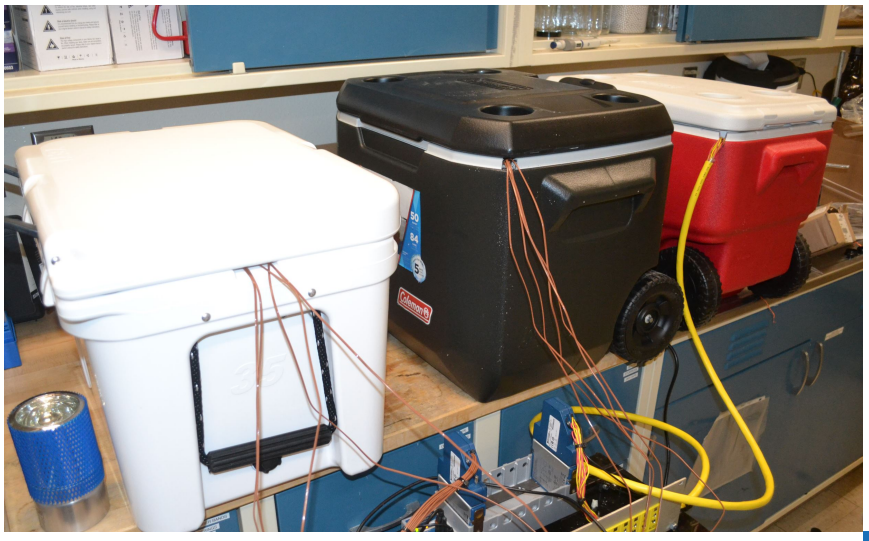

Los Alamos NATIONAL LABORATORY

Tech Snapshot

Biology

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LOW-COST, ACCESSIBLE VACCINE COOLER OPTIONS

Cold Chain Management for Ultra-Low Temperatures

SUMMARY

In response to cold chain management requirements for COVID-19 vaccines, Los Alamos National Laboratory has investigated, built, and demonstrated viability for different cryogenic storage options. With ease-of-access and affordability in mind, these cooler units have been built using commercial off-the-shelf (COTS) components. The team was also able to design a testing method for evaluating the performance of the different vaccine cooler options as part of the Technology Evaluation and Demonstration program. The tested cooler units demonstrated compatibility with either dry ice or liquid nitrogen as the cryogen, along with several commercial solvents. This compatibility demonstration would potentially offer sufficient flexibility for temperature control continuity. Next steps are to investigate industry interest in supporting field testing of the cooler units.

MARKET APPLICATION

The World Health Organization estimates that each year up to 20-50% of vaccines lose their efficacy due to supply chain inefficiencies and lack of proper temperature control. Traditional vaccine temperature storage ranges from -40°C and -4°C. As a result, there have historically been few manufacturers, logistics providers, or pharmacies that have a readily deployable infrastructure for continuous maintenance of ultra-low temperatures. New vaccines requiring sustained ultra-cold temperatures present logistical challenges in clinical settings and in distributed vaccine campaigns. This requires easily deployable alternatives cooler options for supporting ultra-low temperature cold chain management especially in rural areas. The low cost cooler units developed at Los Alamos National Laboratory offer a simple, configurable, option for helping ensure cold chain consistency for shipments requiring ultra-low temperatures.

BENEFITS

The low, cost accessible cooler units could be most useful in environments where little to no traditional chillers or freezers are available, or if an urgent distribution need arises in an otherwise resource-limited area.

- Utilizes laboratory hardware and software testing capabilities
- Leverages LANL's expertise in chemistry, mechanical engineering, and system monitoring
- Provides affordable and accessible cooler options to preserve vaccine viability in rural, isolated, or limited resource environments
- Enables easy incorporation of passive visual and active auditory temperature monitoring

CONTACT

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WHY WE ARE BUILDING LOW-COST, ACCESSIBLE VACCINE COOLER OPTIONS

In response to the COVID-19 pandemic, the Los Alamos team leveraged expertise in chemistry, mechanical engineering, and system monitoring to investigate, built, and demonstrate a new option for cryogenic storage. Using laboratory hardware and software testing capabilities, researchers explored the performance of cooler units, different thermal monitoring options, and thermal stability under different conditions.

WHAT'S BEHIND OUR TECHNOLOGY

Los Alamos researchers built and tested different cooler units by leveraging key properties of cryogens. The tested cooler units are compatible with either dry ice or liquid nitrogen as the cryogen, along with several commercial solvents, potentially offering sufficient flexibility for temperature control continuity should supply chains become disrupted.

OUR COMPETITIVE ADVANTAGES

One of the traditional criticisms of dry-ice packing has been that replenishing the cryogen causes damaging temperature fluctuations. Preliminary lab results from the newly designed testing methodology of the Los Alamos cooler options demonstrated thermal stability of the cooler unit and cooler contents, regardless of number of times the cryogen was replenished. It is estimated that this approach could cost as little as little as 10 cents per dose, assuming 10,000 doses, and excluding the cost of dry ice or other commercial solvents.

OUR TECHNOLOGY STATUS

Using available hardware and software capabilities, Los Alamos has laboratory tested the developed vaccine cooler options. We are seeking Industry feedback and interest in exploring the field viability of this technology and testing methodology. The information herein is for informational purposes only and is not intended for clinical or patient use.

PUBLICATIONS AND IP

A white paper is under consideration.